

# Katherine Dzurilla, Ph.D.

NASA Jet Propulsion Laboratory, California Institute of Technology

Email: [Katherine.a.dzurilla@jpl.nasa.gov](mailto:Katherine.a.dzurilla@jpl.nasa.gov) | US Citizen

Website: <https://science.jpl.nasa.gov/people/katherine-dzurilla/>

---

## Education

University of Arkansas  
2023

Ph.D. Space and Planetary Sciences

Preparing for the Professoriate Micro-certificate

Oklahoma State University  
2017

B.S. Biochemistry, B.S. Physics  
Minors: Chemistry, Microbiology

## Additional training

NASA-ESA International Summer School in Astrobiology  
*School Title: Searching for Life on Ocean Worlds*

June 2023

- One of 30 participants competitively selected with full funding for the NASA Astrobiology Program for this week-long summer school. The summer school involved attending lectures focusing on the astrobiology and past missions to ocean worlds, participating in round-table discussions, and culminated in a presentation of an original astrobiology project capable of being submitted to a grant program.

NASA Jet Propulsion Laboratory Planetary Science Summer School

May 2021-August 2021

- One of 17 participants selected for the NASA's Science Mission Design School in planetary exploration. Attended weekly webinars for 10 weeks before culminating in a 2-week experience at NASA JPL. Course topics regarding mission design and formulation were taught in lectures and applied to a participant led mission concept.
- Our team produced a preliminary mission, Venus Environment Research and Novel Exploration (VERNE), to investigate how global intrinsic magnetic fields might be maintained on rocky worlds, and how they could then go extinct. This mission also observed what role atmospheric sulfur chemistry plays in climates of Earth-like planets. In this mission concept, I served as ground communications lead, in which I constrained communication between the spacecraft and the DSN. Additionally, I assisted with the final presentation on the mission concept to which we presented to a NASA review board comprised of experts in the Venus community.

## Professional Experience

Postdoctoral Fellow, NASA Jet Propulsion Laboratory  
Origins and Habitability Laboratory (advisor: Dr. Laurie Barge)

October 2022-present

- Research focus:

- Phosphorus redox chemistry in Enceladus conditions: studied the conversion of phosphite to phosphate driven by iron minerals in carbonate rich Enceladus analog oceans, with application to prebiotic chemistry on ocean worlds.
  - Prebiotic chemistry on early Earth: studied simple organic reactions that could have occurred in origin of life systems including: transamination of keto-acids, mineral-driven redox reactions of cofactors (quinones), and abiotic synthesis of tryptophan in hydrothermal vents.
  - Biosignatures: creating strategies to detect extant vs. extinct life on Mars and ocean worlds.
  - In-situ Vent Analysis Divebot for Exobiology Research (InVADER): Assisted with biological investigations using field samples taken from hydrothermal systems. Studied biosignature detection within these hydrothermal systems and their application to biosignature detection on Enceladus.
- Assisted with writing and editing NASA ROSES proposals (Exobiology, Interdisciplinary Consortia for Astrobiology Research).
  - Student mentoring: supervised 2 graduate students and 2 undergraduate students (as JPL interns) working on various prebiotic chemistry projects in the laboratory. Held weekly one-on-one research meetings, tracked student experiment progress, mentored students on data analysis (NMR and FTIR), manuscript writing, literature review, and presentation preparation.
  - Outreach work: Participated in STEM outreach initiatives as a member of the OHL outreach committee. Led a NASA SCoPE grant application for a workshop focused on training educators in best practices on minority student's engagement in astrobiology.
  - Co-lead JPL Astrobiology Journal Club: ran weekly meetings of journal club focused on astrobiology literature. Managed list of speakers and paper assignments.

National Academy of Science, Engineering, and Medicine - Space Studies Board Intern  
September 2020-October 2021

- Competitively selected for the Lloyd V. Berkner internship with the National Academy of Science Space Studies Board.
- I was responsible for providing support for the 2023-2032 Planetary Science and Astrobiology Decadal Surveys. My tasks included attending and transcribing minutes from various committee meetings, attending congressional committees in which the Space Studies Board was presenting, and assisting with town hall planning, organization and execution. Additionally, I wrote the glossary for the draft reports.
- Coauthored a white paper for the Decadal regarding the state of orbital debris.

Autonomous Robotics Research for Ocean Worlds (ARROW) Consultant      October 2020-October 2022

- Served as a consultant for a 2-year multi-institute award from the Applied Information Systems Research program led by a team at University of South Carolina. I provided scientific input for the JPL ARROW team in the development of a virtual and physical bed for testing mission concepts investigating ocean worlds. Our design focused on Europa and its surface characteristics; however, it is developed for general ocean world's use.

- One of 12 early career researchers selected to observe Dragonfly’s week-long virtual science team meeting. During this experience, I was exposed to the science, design, management, and schedule of the Dragonfly mission. This provided insight into the operations that occur after a mission is selected by NASA. Through attending I gained an understanding of the logistical and science operations within a mission team environment and the various aspects necessary for mission planning and execution.

Research Assistant, University of Arkansas  
Arkansas Center for Space and Planetary Sciences

January 2018-October 2022

- Research focus:
  - Titan habitability: studied Titan organics and their retention and solubility within liquid hydrocarbons relevant to Titan’s lakes. Investigated the potential physical and chemical changes in organics after interacting with Titan lakes.
  - Tholin production: Produced laboratory analogs to organics formed in Titans atmosphere (tholins). Investigated influences of production variables (such as production time and gas mixture) on resulting organics.
  - Simulation chamber operations: assisted with studies utilizing Titan simulation chambers investigating the influence of Titan surface temperatures and pressures on ice chemistry.
- Managed safety and maintenance of the wet lab and tholin production instruments.
- Organized and led group meetings and conference planning for the planetary science department.

Student Government, University of Arkansas

2019-2022

Graduate and Professional Student Congress (GPSC) (group of 100 elected representatives from each department and college at the university. Representatives advocate to the university, state government, and federal government for the interests of all graduate students at the University of Arkansas. Representatives must campaign in the yearly GPSC election and be voted into their positions each academic year by the student body)

*President 2021-2022*

- Led the GPSC executive board
- Represented the GPSC on the national stage through attendance at national conferences and legislative action days.
- Met monthly with campus leadership and administration to update on graduate student issues.
- Sat on search committee for the hiring of a new university president.

*Vice-President 2020-2021*

- Led Ad Hoc committee to author the UArk “Graduate Student Bill of Rights”.
- Led a restructuring effort to create and optimize an onboarding process for new GPSC leadership.
- Organized the university’s annual Research Symposium.

*Treasurer 2019-2020*

- Organized, budgeted, and oversaw distribution of a 900K budget for the organization.
- Led the review and distribution of 50K each year for GPSC travel grants.

- Assessed financial standing and collaborated with other student representatives to accomplish organizational goals.
- Oversaw the GPSC Finance Committee.

## Publications

**K. A. Dzurilla** and B. L. Teece (2024) Discriminating between extinct and extant life detection: implications for future Mars missions. *Front. Astron. Space Sci.* 11:1452362. <https://doi.org/10.3389/fspas.2024.1452362>

T. J. Mahra, B. L. Teece, G. Zaugg, **K. A. Dzurilla**, J. M. Weber, L. M. Barge (2024) Laboratory analogues of black smoker hydrothermal vent mineral facies relevant to planetary science. 75th International Astronautical Congress (IAC). IAC-24-,E2,3-GTS.4,2,x82038

A. Omran, **K. A. Dzurilla**, L. E. Rodriguez, A. Gonzalez, T. Feng, J. Abbatiello, L. M. Barge, M. Pasek (2024) Far-from-equilibrium polyphosphate generation from phosphite oxidation and its implications for the early Earth and ocean worlds *ChemSystems Chem* (in revision)

J.M. Weber, T.C Marlin, M. Prakash, B.L Teece, **K. A. Dzurilla**; L.M. Barge (2023) A Review on Hypothesized Metabolic Pathways on Europa and Enceladus: Space-Flight Detection Considerations. *Life*. 13, 1726. <https://doi.org/10.3390/life13081726>

A Hossen., S. Kharade, B. Schmerl, J. Cámara, J. M. O’Kane, E. C. Czaplinski, **K. A. Dzurilla**, D. Garlan, and P. Jamshidi, (2023) CaRE: Finding Root Causes of Configuration Issues in Highly-Configurable Robots, *IEEE Robotics and Automation Letters*, vol. 8, no. 7, pp. 4115-4122, July 2023, <https://doi.org/10.1109/LRA.2023.3280810>

E. Czaplinski, X.Yu, **K. A. Dzurilla**, V. Chevrier, (2020) Experimental Investigation of the Acetylene–Benzene Cocystal on Titan, *The Planetary Science Journal* 1(3):76 <https://doi.org/10.3847/PSJ/abfb57>

## *Manuscripts in preparation*

B. L. Teece, R. A. Barco, **K. A. Dzurilla**, L. E. Rodriguez, P. Sobron, J. Huber, M. Leung, J. M. Weber and L.M. Barge; Serpentinite enhances microbial biosignatures in seafloor hydrothermal samples analogous to Enceladus’ chondrite core. (in prep for *PNAS*)

**K. A. Dzurilla**, B. L. Teece, J. M. Weber, L. M. Barge; Potential Redox reactions of Phosphorous on Enceladus (in prep *Nature Geosciences*)

T. J. Mahr, B. L. Teece, G. Zaugg, **K. A. Dzurilla**, J. M. Weber, L. M. Barge; Laboratory analogs of black smoker hydrothermal vent mineral facies relevant to planetary science. (in prep for *ACS Earth and Space Chemistry*)

J. M. Weber, **K. A. Dzurilla**, D. E. LaRowe, A. D. Goldman, B. L. Henderson, and L. M. Barge; Abiotic Redox Reactions of Quinones Driven By Ocean World Relevant Minerals (in prep for *PNAS*)

## Selected Published Conference Abstracts

**K. Dzurilla**, J. M. Weber, D. E. LaRowe, A. D. Goldman, B. L. Henderson, and L. M. Barge (2023) Abiotic Redox Reactions of Quinones Driven By Ocean World Relevant Minerals, *LPSC LIV*, Abstract #2362.

H. Alpert , C. Ahrens, T. Bell, C. Bierson, K. Bonnet, R. Dhingra, R. Dinsmore, **K. Dzurilla**, J. Garland, E. L. Gustafson, J. Knicely, C. Kremer, V. Lowry, N. Naz, S. Niemoeller, P. O'Brien, A. White 5 , A. Zucherman, L. Lowes, T. Hudson, K. Mitchell. (2022) Verne: Revealing The Mysteries And Histories Of Venus, *LPSC LIII*, Abstract # 1012.

E. C. Czaplinski , J. Cámara, **K. Dzurilla**, M. A. Hossen, B. Schmerl , J. Su, and P. Jamshidi., (2022) Ai For Addressing Unknown Unknowns In Outer Solar System Missions, *LPSC LIII*, Abstract # 2734.

**K. Dzurilla**, D. Nna Mvondo, D. Mège, V. Chevrier, (2022) Detection and Reactivity of Titan Tholins in Liquid Hydrocarbons Containing Polar Compounds, *LPSC LIII*, Abstract # 2849

**K. Dzurilla**, D. Nna Mvondo, D. Mège, V. Chevrier, (2020) Detection and Reactivity of Titan Tholins in Liquid Hydrocarbons Containing Polar Compounds, *LPSC LI*, Abstract # 2624

## Skills

Experience with sputtering and tholin production

Experience with cryogenic and LN experimental protocols

Conducting mineral and organic benchtop experimental procedures

Performing benchtop experiments in anoxic conditions

Nuclear Magnetic Resonance (NMR) spectroscopy

Fourier-transform infrared spectroscopy (FTIR)

Matrix Assisted Laser Desorption Ionization (MALDI)

## Selected Activities, Service, Leadership

Scientific Society for Astrobiology (SSA)

- Recording Secretary (2024 – present): attend closed monthly BOD meetings, record meeting minutes, prepare society newsletter for distribution.
- 2024-present: Member of the SSA Board of Directors (BOD)

NASA ROSES Panelist

2020-present

NASA Astrobiology Program Research Coordination Networks

Network for Ocean Worlds (NOW):

*Future Leaders of Ocean Worlds (FLOW) (Early Career Group in NOW)*

- 2025: FLOW Co-Lead: oversaw FLOW committee progress, delegated FLOW officer tasks, ran monthly meetings, and represented FLOW coordination with NOW leads on large-scale events.
- 2024: NOW Working Group Co-chair: Interfaced with the NOW steering committee, and advocated for early career researcher collaborative efforts to the NOW leadership. Additionally,

responsibilities included a seat on the FLOW executive board, in which I helped to lead and organize FLOW.

- 2022-present: Member of Future Leaders of Ocean Worlds (FLOW).

*Network for Life Detection (NfoLD):*

- 2023-present NfoLD Early Career Council Member

## Outreach

Planetary ReACH Professional Development Workshop Partner: January 2024-September 2024  
The Planetary ReaCH (Resources and Content Heroes) program prepares planetary science subject matter experts (SMEs) to engage audiences, particularly the Black and Latinx communities, with planetary science content through 3-day Planetary Engagement workshops.

- As part of a team located at JPL, we assisted the Planetary ReACH team as local community members in the planning and execution of the workshop held in Los Angeles on September 24th –26th. During the workshop event, we were able to participate as workshop SMEs and learn best practices for outreach and community engagement for Latinx and Black communities.

Letters to a Pre-Scientist (LPS) Pen Pal August 2020-present

- Volunteered through the LPS nonprofit organization which connects STEM professionals with students to demystify STEM career pathways.
- Through this outreach program, I was matched as a pen pal with a 6<sup>th</sup> – 8<sup>th</sup> grade student at an underprivileged school to write 4 letters to one student over an academic year. Letter topics included journeys through higher education, the daily life of a scientist, and struggles encountered during my career experience.

## Invited Talks

College of Charleston Seminar Series, *Phosphorus Reactions on Ocean Worlds and its Influence on Habitability* August 29<sup>th</sup>, 2024

NOW Steering Committee Lightning Talk Series, *Phosphite Oxidation through Iron Interactions On Enceladus*, August 21<sup>st</sup>, 2024

PCE3 Seminar Series, *Potential for Abiotic Reduction of Quinones through Mineral Interactions*, June 29<sup>th</sup> 2023

## Teaching Experience

Honors Chemistry 1 Lab TA- University of Arkansas	Fall 2022
Chemistry for non-Majors Lab TA- University of Arkansas	Spring 2021
Introduction to Astronomy Lab TA- University of Arkansas	Fall 2020

## Selected Awards

GPSC Leadership Award (awarded to a GPSC member who exhibits outstanding leadership during the academic year as voted on by the student body)	2022
Hartmann Student Travel Award (awarded by the Division for Planetary Sciences for grad student travel to an international conference)	2019
3 Minute Thesis Award – 2nd place	2017